

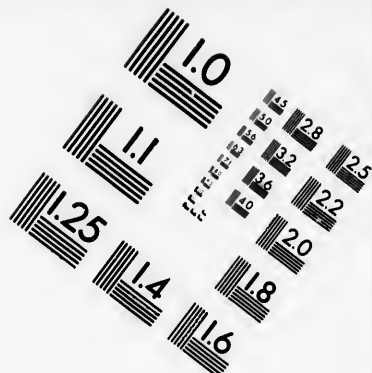
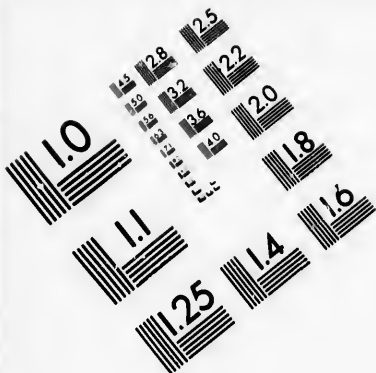
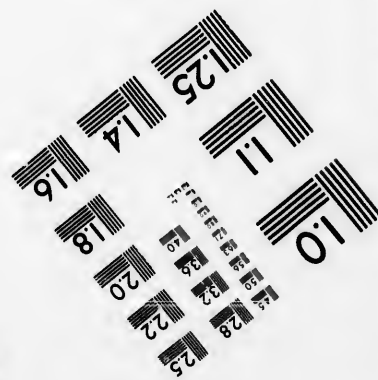
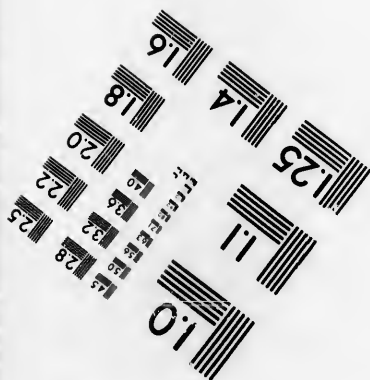
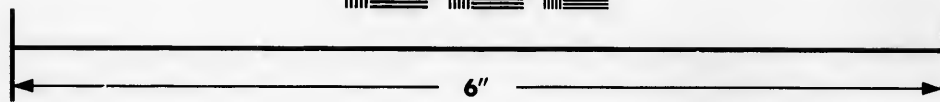
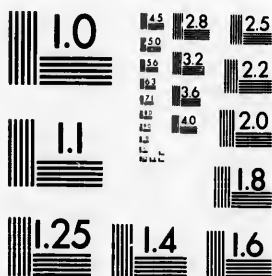


IMAGE EVALUATION TEST TARGET (MT-3)



Photographic
Sciences
Corporation

23 WEST MAIN STREET
WEBSTER, N.Y. 14580
(716) 872-4503

**CIHM
Microfiche
Series
(Monographs)**

**ICMH
Collection de
microfiches
(monographies)**



Canadian Institute for Historical Microreproductions / Institut canadien de microreproductions historiques

© 1992

Technical and Bibliographic Notes / Notes techniques et bibliographiques

The Institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming, are checked below.

L'Institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

- ☐ Coloured covers/
Couverture de couleur
- ☐ Covers damaged/
Couverture endommagée
- ☐ Covers restored and/or laminated/
Couverture restaurée et/ou pelliculée
- ☐ Cover title missing/
Le titre de couverture manque
- ☐ Coloured maps/
Cartes géographiques en couleur
- ☐ Coloured ink (i.e. other than blue or black)/
Encre de couleur (i.e. autre que bleue ou noire)
- ☐ Coloured plates and/or illustrations/
Planches et/ou illustrations en couleur
- ☐ Bound with other material/
Relié avec d'autres documents
- ☐ Tight binding may cause shadows or distortion
along interior margin/
La reliure serrée peut causer de l'ombre ou de la
distorsion le long de la marge intérieure
- ☐ Blank leaves added during restoration may appear
within the text. Whenever possible, these have
been omitted from filming/
Il se peut que certaines pages blanches ajoutées
lors d'une restauration apparaissent dans le texte,
mais, lorsque cela était possible, ces pages n'ont
pas été filmées.
- ☐ Additional comments: /
Commentaires supplémentaires:

- ☐ Coloured pages/
Pages de couleur
- ☐ Pages damaged/
Pages endommagées
- ☐ Pages restored and/or laminated/
Pages restaurées et/ou pelliculées
- ☒ Pages discoloured, stained or foxed/
Pages décolorées, tachetées ou piquées
- ☒ Pages detached/
Pages détachées
- ☒ Showthrough/
Transparence
- ☒ Quality of print varies/
Qualité inégale de l'impression
- ☒ Continuous pagination/
Pagination continue
- ☐ Includes index(es)/
Comprend un (des) index
- Title on header taken from: /
Le titre de l'en-tête provient:
- ☐ Title page of issue/
Page de titre de la livraison
- ☐ Caption of issue/
Titre de départ de la livraison
- ☐ Masthead/
Générique (périodiques) de la livraison

This item is filmed at the reduction ratio checked below/
Ce document est filmé au taux de réduction indiqué ci-dessous.

10X	12X	14X	16X	18X	20X	22X	24X	26X	28X	30X	32X
					✓						

The copy filmed here has been reproduced thanks to the generosity of:

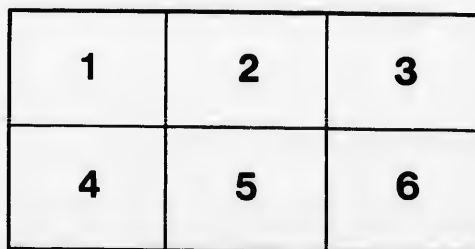
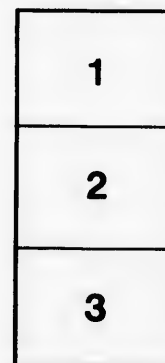
National Library of Canada

The images appearing here are the best quality possible considering the condition and legibility of the original copy and in keeping with the filming contract specifications.

Original copies in printed paper covers are filmed beginning with the front cover and ending on the last page with a printed or illustrated impression, or the back cover when appropriate. All other original copies are filmed beginning on the first page with a printed or illustrated impression, and ending on the last page with a printed or illustrated impression.

The last recorded frame on each microfiche shall contain the symbol $\rightarrow$ (meaning "CONTINUED"), or the symbol ∇ (meaning "END"), whichever applies.

Maps, plates, charts, etc., may be filmed at different reduction ratios. Those too large to be entirely included in one exposure are filmed beginning in the upper left hand corner, left to right and top to bottom, as many frames as required. The following diagrams illustrate the method:



L'exemplaire filmé fut reproduit grâce à la générosité de:

Bibliothèque nationale du Canada

Les images suivantes ont été reproduites avec le plus grand soin, compte tenu de la condition et de la netteté de l'exemplaire filmé, et en conformité avec les conditions du contrat de filmage.

Les exemplaires originaux dont la couverture en papier est imprimée sont filmés en commençant par le premier plat et en terminant soit par la dernière page qui comporte une empreinte d'impression ou d'illustration, soit par le second plat, selon le cas. Tous les autres exemplaires originaux sont filmés en commençant par la première page qui comporte une empreinte d'impression ou d'illustration et en terminant par la dernière page qui comporte une telle empreinte.

Un des symboles suivants apparaîtra sur la dernière image de chaque microfiche, selon le cas: le symbole $\rightarrow$ signifie "A SUIVRE", le symbole ∇ signifie "FIN".

Les cartes, planches, tableaux, etc., peuvent être filmés à des taux de réduction différents. Lorsque le document est trop grand pour être reproduit en un seul cliché, il est filmé à partir de l'angle supérieur gauche, de gauche à droite, et de haut en bas, en prenant le nombre d'images nécessaire. Les diagrammes suivants illustrent la méthode.

qu'il
e cet
nt de vue
age
cation
qués

THE

14

GOLD DIGGER'S

GUIDE.

BY J. BAILEY.

QUEBEC:
PRINTED BY HUNTER, ROSE & CO., ST. URSULE ST.

1864.

ENTERED, according to the Act of the Provincial Parliament, in the
year one thousand eight hundred and sixty-four, by J. BAILEY,
in the office of the Registrar of the Province of Canada.

IN
I belie
one in
inform
quick
the g
found
prints
the C
the R
I exp
direct
of usi
minin
in the
the p
works
have
never
any o

PREFACE.

IN bringing this little pamphlet before the public, I believe I am supplying a want that is felt by every one interested in gold mining. The most necessary information for the gold miner is a knowledge of the quickest and most successful methods of separating the gold from the different formations in which it is found. Where it is found, rumor and the public prints will most readily inform him. The "Route to the Chaudiere Mines," and the short extracts from the Rev. Mr. Douglas' pamphlet on those mines, will, I expect, be found useful and interesting. The directions for mining, and for the making and manner of using the different tools and machines wanted in mining, are the result of over four years' experience in the gold fields in Australia. I might have increased the pamphlet in volume, by extracts from geological works, but I doubt whether such information would have made it more useful to the gold miner. I have never heard that geological knowledge has enabled any one to find gold. The California gold mines were

not discovered by a geologist ; nor was it a geologist that opened the gold mines in Australia. It was a knowledge acquired in California which induced Mr. Hargraves to return to Australia, and enabled him to discover the gold mines in that country ; and it is such information as he acquired that I have tried to give in the following pages.

THE AUTHOR.

QUEBEC, April 20, 1864.

ecologist
was a
ed Mr.
him to
d it is
ried to

IOR.

CONTENTS.

	Page.
The Route to the Chaudiere Mines.....	1
The First Discovery of Gold.....	5
Mining for Gold.....	11
Hydraulic Process.....	12
Sluicing.....	13
The Sluice.....	14
The Long Tom.....	16
The "Jenny Lind".....	18
Puddling.....	19
How to make a Puddling Machine.....	20
The Cradle.....	22
Deep Sinking.....	27
Quartz Mining.....	30

G

S
acres
the
ing
aga
la V
its
now
you
you
has
exc
stra
cross
and
left
men
right
St.
door
can

THE GOLD . DIGGER'S . GUIDE.



The Route to the Chaudiere Mines.



STARTING from Quebec, a ferry boat takes you across the St. Lawrence to Point Levi. Turning to the right, two or three hundred yards from the landing place, you ascend a hill, a bend to the left, and again to the right, and you are in Notre Dame de la Victoire. The hill is now straight for the rest of its length. At the top you again turn to the right, and now I may say that you have no more hills before you worth mentioning. Not quite a mile further on, you again turn, this time to the left. The telegraph has a branch this way from this corner. With the exception of one or two slight turns, the road runs straight into St. Henry's. Opposite the church you cross the bridge over the river "Etchemin." A mile and a half or so further on, you pass a road on your left which goes to Frampton, and other back settlements ; still further on there is another turning to the right (which would take you through the Village of St. Isidore), but your way is straight on, past the door of a small tavern ; once past this tavern and you cannot easily get off the main road. Farmers' houses

are on both sides of the road as you go, and any of them will readily prepare you either meals or a bed, such as they are, for which they make very moderate charges. In the hotels and refreshment houses along the road, they seldom charge more than 20 cents for either meals, or bed. Some 13 or 14 miles from the bridge, topping a small hill, you have before you the "Chaudière River." It is here about 100 yards wide, and starting from this point, a boat drawing not more than 18 inches of water would be able to run up to the "Devil's Rapids" above St. François; but in very dry seasons, the river in some places has not even enough water to float a boat of that draught. From this point, to I believe 20 miles higher up than St. François, the road is along the left bank of the river. At the top of this little hill, you have the first indications of a gold country; to the left of the road, most of the fields (except those which lie very low) have surface indications of gold. Quartz boulders, well water worn, lie here and there on the road. The next village you pass through is St. Mary's. After you leave the village, you will observe that the road is most of its length on low flat ground, and on the other side of the river you will perceive in places the same low ground, which I believe to have been deposited by the river. I think that parties would have a rich return for their labor if they would sink on these flats. The lower parts of the flats, that is, I mean, where the stream has apparently made a turn, will I think be found rich. It is probable that they cannot be worked, except in a very dry season, when the river is very low, and even then, it would require parties who had some experience in "slabbing;" but I am confident that if well tried, large "finds" would be made. I would here caution parties against travelling this

road during the time of the "Spring Floods," as I am told the river over flows all those flats I have mentioned. Every fall the *habitans* take the fences down to save them from being carried away in the spring, and the traveller will perceive that all the houses are built just on the edge of the rising ground.

The next parish is St. Joseph's, which is, as I have said, to the left of the road on the high ground. Should the "rush to the diggings" be as great as it is expected, the inhabitants of this village will learn what they have lost by not having the main road run along the edge of the hills, and through the village.

Parties who travel "digger" fashion, with their tents, etc., on their backs, or with a cart, camping out every night, will be delighted with this road, (except in wet weather, when I fear it will remind Australians of the "winter roads" in that part of the world). The scenery is really beautiful, and they need not travel half a mile without finding good camping ground. About five miles from St. Joseph, a small stream, the river "Des Plantes" is crossed. Some gold has been found on the banks of this stream. St. François, the next parish, is about 11 miles from St. Joseph; it is on the right bank of the river, the crossing being made by a rather primitive sort of a ferry, a strong rope stretched across the river, and a large "scow" drawn backwards or forwards as wanted. This kind of ferry is quite common from St. Isidore up.

Some distance higher than the village is the "Devil's Rapids," and at this spot on both sides of the road, are large masses of quartz which it is said contains gold. It must be this reef which crops out about the middle of the river, at the top of the rapids, from which a good deal of heavy gold has been taken. In 1856, in Australia, diggers first mentioned

that (almost invariably) wherever there was a rich quartz reef, there was a rich gully convenient, and that at the top of rich "gullys" that had been worked, rich reefs would be found, and so it proved in many cases. From rich reefs they traced rich gullys, and at the heads of rich gullys they discovered rich reefs.

The miners also found that the same reefs might run for a considerable distance across the country, cropping out here and there, and again sinking. I traced one for near 50 miles, and it was worked at four different places, at Maryborough, Bet Bet Reef, Sandy Creek, and Kingower, and I have no doubt, experience will prove it to be the same in this country.

About a mile above the rapids is the "Touffe de Pins" or River Gilbert. The road to these diggings here turns to the left; it does not run very near to the ground that has been worked, but should much of the ground be tried next summer, roads would be made in all directions by the miners. Diggers will labour under many disadvantages in Canada; in the first place, they will have to travel by the made roads, as it would be almost impossible for them to make their way (even without a load) through the bush. And in commencing to work they will find the density of the bush, the roots, etc., a great drawback. They will have plenty of water for almost any manner in which they wish to work, excepting the "hydraulic process," by which method very little will be done, unless water is supplied in the same way as in California.

I would not advise diggers taking any tools with them, except a pick and shovel, and even these they will be able to get at the diggings. They will do well to bring a tent with them, unless they determine to

build a bark shanty or log hut. For a tent, they will find strong grey cotton, at least as good (I think better) than any canvass or American duck used; it is also lighter to carry. I would not advise them to bring much clothing with them; it will be more troublesome than it is worth. Good strong boots are required, such as farmers use. And last, but most wanted, money enough to stand a run of ill-luck, which the majority will be sure to meet, even though the diggings prove richer than either California or Australia.

The First Discovery of Gold.

Gold was first found in Canada nearly 40 years ago. From all accounts, the next piece (about the size of a pigeon's egg) was picked up, by a young woman, in a small stream (now called the "Gilbert,") in the parish of St. François, county of Beauce.

Her father made further search after the precious metal, but, it seems, did not find enough to make the pursuit profitable. Enough was found, however, to induce the *seigneur* to apply for, and obtain, in 1846, an exclusive privilege to mine (within the limits of his seigniority,) subject to certain conditions, which conditions, it appears, have not been complied with.

In a very interesting paper read before the Literary and Historical Society of Quebec, by the Rev. James Douglas, he says (having mentioned the first discoveries):—"Exploration was now carried on vigorously on the Chaudière and its tributaries, and it soon appeared that the main river and all its tributaries, great and small, from St. Marie's almost up to Lake Megantic, were charged with gold. Owing to the sluggishness of the main stream, up to its junction with the Du Loup, that is over at least 20 miles of its auriferous bed, nothing more than prospecting has been done upon it, except at one or two spots where it has laid bare the ledge, as at the 'Devil's Rapid.' There a highly remunerative quantity of large gold has been found. But, while all its tributaries were discovered to be auriferous, it was found that, at least below the bend of the river, at the mouth of the Du Loup, the streams which flowed in from the west were poorer than those which drained the ridge on its east bank. These are the Guillaume, the Des Plantes, the Touffe de Pins, and the Famine, with a number of insignificant rivulets.

"Where the Chaudière and the Du Loup join, they are streams of about equal bulk. Here the Chaudière takes a bend and runs almost due north and south, while the Du Loup flows in from the south-east. The current of the Chaudière becomes now much more rapid, and at two spots, at the greater and lesser falls, both within two miles of the junction, the ledge is exposed for a considerable distance. At both these spots gold was early found jammed in the crevices of the slate. More recently the stream above this point, especially the Stafford Brook, on the right bank, and the Condé, on the left, have been successfully washed for gold; the same result has attended the

expl
the

"

the
Tou
when
bed,
eigh
for
that
It is
have
to p
comp

"

At
depo
week
was
vial
the
to c

"

comp
min
done
test
a fa
prod

In
carr
mou
an a
wash

exploration of the Du Loup and its tributaries, up to the boundary line of the State of Maine.

"The Chaudière Mining Company (having leased the rights of the *seigneur*,) began operations on the Touffe de Pins, at a point about a mile from its mouth, where the river had gradually receded from its original bed, leaving behind it an extensive flat, covered with eight or ten feet of debris. Here the company worked for several years, but so unskilfully and so lavishly, that the receipts did not cover the expenditure. It is to be regretted that the first attempt should have been made under circumstances so little likely to prove successful, for the signal failure of the company helped to retard the progress of the mines.

"The Des Plantes was also worked in several places. At one spot, immediately above the first fall, a rich deposit was struck upon, which yielded for several weeks from three to ten ounces a-day. Here also was tried the experiment of dry digging. The deluvial deposit was washed from the hill side, far above the level of the brook, but not with such success as to encourage the company to proceed.

"It was on this stream, and on the Famine, that the company was working when Lord Elgin visited the mines in 1853. On the latter river but little was done, and that on so small a scale as not fairly to test its capabilities; as, however, it has always been a favorite stream with the *habitans*, it must have produced a considerable quantity of gold."

In 1851 and 1852 the Canada Mining Company carried on extensive operations on the flats at the mouth of the Du Loup. The gravel for about $\frac{3}{4}$ of an acre, with an average thickness of two feet, was washed and yielded 2.107 dwts. of gold, worth \$1,826.

In 1852 about the same extent of ground was washed, and gold to the value of \$2,496 was obtained.

Since 1855 the diggings have been abandoned to the *habitans*, and it is not known whether they obtained much or little, as it was their interest to conceal their success, lest tribute should be demanded of them. Five brothers, of the name of Poulin, seem to have been the most successful, and in the fall of 1862 they struck on some rich ground, on the banks of the "Gilbert." The spot is on the north branch of the river, about four miles from its mouth. Mr. Douglas says:

"It was too late in the season when the discovery was made, to do more than ascertain its exceeding richness; but so soon as the spring freshets had subsided, they betook themselves to work, and with such success that the fame of their good fortune spread rapidly through the parish, and the most impassive of the *habitans* flocked to the locality. The river was explored for about a mile of its length, and two spots selected as the richest. One on the lot of a man called Vielleux, the other about 15 acres lower down, on ground belonging to one Rodrigue. The upper diggings attracted the greatest crowds, and, up to the middle of July, Rodrigue himself and three of the Poulins, his associates, were undisturbed in their possession of the lower diggings. Within the six weeks from the beginning of June till near the middle of July, several acres of ground on Vielleux's lot were thickly perforated with holes, and the bed of the river pretty thoroughly washed out, and a great deal of gold must have been obtained. The largest piece found was said to have been picked up by a woman named Parré, and to have been sold for \$88. One party of six,

including the two most noted Poulins, acknowledged finding 15 ounces in three days, and another party, of the same number of hands, found six and a half ounces in two days. The lower diggings seem to have been caused by a bar of hard rock, which, crossing the stream almost at right angles, appears to have intercepted the gold in its downward progress, for below the bar nothing of any consequence has been found, while immediately above it the yield seems to have been enormous. The soil became poorer as it receded upwards. It was first above the bar that Rodrigue and his company worked the bed of the river, in the beginning of the season, and it was here they bought the location which has proved so rich.

“Up to the middle of July, no work had been done upon the banks, the crowd being retained at the upper diggings, and the bed of the stream affording occupation enough to the four men who composed Rodrigue's party. They worked 12 full days, and found, with nothing better than tin pans, 10 lbs of gold, and, be it said to their credit, they were honest enough to admit it, and give a quarter in tribute. The location which, after this, Rodrigue and his party bought was one hundred and fifty feet long by fifty feet wide. They selected a part to work themselves, and sold the rest, piece meal, at prices which must have brought them in several times what they paid for the whole. Their find, after exhausting the bed of the river, somewhat fell off, but while washing the banks they got, for instance, one day one lb., and the following day ten ounces. But it must be remembered that this was with a sluice, whereas previously they had used only a tin pan. Their largest

piece was sold for \$200; the next largest weighed almost three ounces.

"What they found in all they did not know themselves, as they frequently sold parcels of gold without keeping accurate account of it; but the proceeds of the summer did not probably amount to less than 24 lbs., which would give 6 lbs. (worth \$1,296,) to each man, or supposing them to have worked eighty days, that is twenty days a month for four months, which is more than they probably did, their wages were per man over \$15 a day. One day Rodrigue, working alone with an old man, found two ounces two penny-weights and eight grains, worth \$38.

"The conditions under which the alluvial gold is found vary with the different character of the river beds. The Des Plantes, between the lower and upper falls, where alone any mining has been done, is narrow and precipitous; there is, therefore, but little depth of deposit upon the ledge, and that of a gravelly nature; hence the gold is found in largest quantity upon the ledge. The bed consists of a hard grauwacke schist, dipping almost perpendicularly, and interstratified by large dykes of serpentine. Above the second fall its character totally changes, and it runs sluggishly over a kind of plateau. This part has not been thoroughly explored. The Touffe de Pins is also rapid, but the valley through which it runs is seldom so narrow. Beds of clay alternate with those of gravel to the depth, sometimes, of eight and twelve feet, and a stiff clay, when lying immediately upon the slate, is often as rich throughout as where it rests upon the ledge. This was the case at several spots at the Rodrigue mine. The bed is composed of dark slate, very

oper
rally
above
then
and
wor
dep
abo

I
last
mar
may
it is

C
tur
oth
this
V
abo

open in its cleavage. The Famine resembles generally the Touffe de Pins; but about a mile and a half above the falls, that is about five miles from its mouth, there commences an extensive deposit of clay, sand and gravel. Where gold has been most extensively worked in the Du Loup, that is at its mouth, the deposit is composed of loose gravel, averaging not above two feet in thickness."

In the explorations for copper mines during the last fall, it is said that gold has been discovered in many localities in the eastern townships; but as there may be but little truth in any of these reports, perhaps it is as well not to mention the places named.

Mining for Gold.

Gold is very often found on the surface, in a mixture of sand, quartz, iron-stone, slate pebbles, and other stones; sometimes precious stones are found in this kind of surface earth.

Where water can be obtained from 40 to 50 feet above your "surface," and you have a good outlet

for your "tailings," the "hydraulic process" will be found the most profitable way of working surface. In California, where they have great water power, they wash away the top earth to a considerable depth, to get at the "washing stuff," which contains the gold, and which lays generally on the bed rock. On the Chaudière, places may be found where a good "head" of water can be obtained; in such places parties can go to work in the following manner:—It is only hills or high ground which are worked by the hydraulic process. A ditch or "ground sluice" is dug all round the base of the ground you intend to work; from its lowest part, this ditch is continued to your sluice (a description of which will be found further on). The sluice should not have a greater inclination than from four to eight inches in 12 feet; at a greater inclination than eight inches you are liable to lose fine gold. From where you have your head of water, you require a strong hose made of hide or strong canvass, terminating with a pipe and nozzle, such as is used with "fire engines." In most parties, one man can manage the pipe, and with it soon wear holes and furrows in the earth; commencing low and working up, in this manner the descending water carries all the loosened earth into the sluice. When you have got well to work, large masses of earth can be loosened; when this is done, the earth should be broken up either with picks or by the force of the water, and the party can be variously employed, seeing that the earth is conveyed to the sluice, keeping the sluice clear of large stones, roots, etc., which often dam it up, and cause the water to run over the side of the sluice, carrying the gold along with it.

"Sluicing" as it is generally worked in Australia, and as it will be worked in Canada, does not require much water. A very small stream, such as the "Des Plantes" or the "Gilbert," in the driest seasons, will supply enough water for all the sluices that could possibly be worked in the neighbourhood of those streams; about 12 square inches of water will work a sluice of 14 inches wide. "Surface" will generally be found on hills, and can be worked with a sluice, "long tom," or cradle. Where you can get a head of water, even a few inches higher than the "surface," you can very profitably employ a sluice.—Place the top length of the sluice on the lowest part of the ground you intend to wash, having the water (about eight or ten inches will be found sufficient) conveyed to your sluice by a common canvass hose, or wooden "dal" or spout. Have your sluice at a proper inclination; if the gold is very fine, about four inches in twelve feet will be found sufficient. One or two men, at each side of the sluice, are kept constantly at work, picking up the surface and shoveling it into the sluice. When the surface has a "slate" bottom you had better pick up the slate to some depth, breaking it up small enough to lay in the bottom of the sluice; and one of the party will be profitably employed using a knife to scrape the pieces of slate, and throw them out of the sluice, when clean. As I have said before, you must prevent the sluice being filled up with roots or stones.

Once a week or so, generally on a Saturday, you "clean up," as it is called. You commence at the lower end of the sluice (*a*), allowing but very little water to run; you take out the "riffle," and carefully wash

the sand, gold, etc., into your riddle, which of course, is in your large pan; having cleaned the first length of your sluice, you clean the next length, and so on. Where the ground presents obstacles to "sluicing," the "long tom" may be used.



SLUICE.

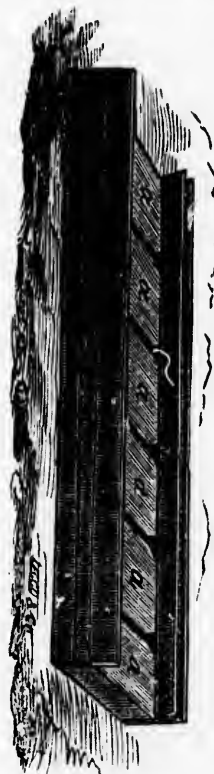
A "sluice" is a number of long boxes open at both ends; the boxes are generally from twelve to fourteen feet long, from fifteen to eighteen inches wide, and the sides (*a*) about twelve inches high. Common one-inch boards will do to make them; one end is made as much less in width, as to allow of the boxes fitting into each other. About four inches from the ends, pieces are nailed on the sides to form a groove, in which a piece of board (the riffle *b*) three inches high, is fitted, and as the earth is washed down the sluice, the sand and gold lodges against the riffle. Sluices are worked of different lengths, and where there is but little

clay in the stuff to be washed, ten or twelve lengths of boxes will be found enough. In California, when the gold is very fine, they add two or three

length
box
tom
high
squa
be o
the
the
half
bloc
the
the
wed
and
keep
The
about
leav
the
box
the
man
who
caci
ing
In
gold
first
and
inst
used
hour
riffle
the
whol

lengths of boxes, made as follows: the bottom of the box is covered with a false bottom of blocks (*a*) four inches high, cut off the end of a square log. These blocks must be one inch less in width than the boxes, and when fixed in the box, must have a space of half an inch between each block, and the same between the blocks and the sides of the box. A piece of board wedged between the blocks and the sides, and nailed, keep the blocks from moving. The corners of the blocks, about three inches, are cut off, leaving triangular spaces at the sides of the box. These boxes will be found to save the finest gold, and there are many companies using them, who believe they are as efficacious as quicksilver in saving fine gold.

In a sluice, most of the gold should be caught in the first three or four riffles, and when quicksilver is used instead of the boxes, with block bottoms, it is used as follows: when the sluice has been worked an hour or so, sand, etc., will be found lodged against the riffles. Commencing at the fourth riffle, you lay on the top of the sand, a shallow bed of quicksilver the whole width of the box. Three or four riffles served in



this manner will be found enough. When cleaning up, the quicksilver must be strained through a chamois leather (p. 17) and the gold separated from the residue, by being held on an old shovel (or piece of sheet iron) over a strong fire.

THE "LONG TOM"

Is made as per cut,—the bottom board (a) about two feet wide, and from fourteen to sixteen feet long, of one inch stuff; the sides of the same thickness, and about nine inches high. The sides should be three or four feet longer than the bottom. From the end of the bottom board, the sides are rounded off at a slight curve. Thick sheet iron of the same width as the bottom, and four or five feet long, is required for the "Tail b." Commencing one foot from the end, it is perforated with holes about a quarter of an inch in diameter (about one in every inch) for two feet in length and the width of the iron; one foot of the sheet iron is sunk its own thickness, in the bottom board, the perforated part of the tail being clear of the bottom board. Underneath, and supporting the end of the bottom board, is a box (called a Riffle Box, d), two inches wider than the tom, and three feet long, and about six inches deep; it is divided into two parts by a cross piece the same height as the sides.



The tom must have an inclination of twelve or fifteen inches in the length of it; the riffle box must have the same inclination. The stuff to be washed is thrown into the upper end of the tom, where it is worked about with a shovel, until all the earth and clay is well separated from sand, etc.; as this done, the water carries it to the lower end of the tom, where a second man stands, who passes all he can through the tail of the tom, throwing off the tail all that will not pass, first seeing there are no nuggets among the stones.

The small pebbles, sand, and gold, fall into the upper end of the riffle box, and as there is a constant fall of water into the box, the gold is carried under the sand, and lodges against the cross piece; when the gold is very fine, a shallow box (c) to contain quicksilver, about three inches wide, is made to fit at the lower end of the riffle box. It should be firmly fixed, at the same height as the end of the riffle box, and present a surface of quicksilver three inches in width, over which all the sand, gravel, etc., has to pass, and it will be found to save most of the fine gold, which would otherwise escape.

In the evening, the sand, etc., in the riffle box is "panned off." The quicksilver is strained through a stout piece of chamois skin, care being taken to leave but little quicksilver amalgamated with the gold, as in the ordinary way of separating the gold from quicksilver, the silver is lost. This is generally done by holding the amalgamated gold and silver on a shovel over a fire: the quicksilver evaporates, leaving the gold behind.

"THE JENNY LIND."

A "Jenny Lind" is made in the same manner as a "long tom," but only half the length. The "tail" is made something wider than in the "long tom," and has the "riffle box" to correspond in width, and the only difference is in the working, one man being sufficient to work the "Jenny." He first puddles, or washes the earth at the top, and then passes it through the tail.

The simplest and most necessary tools the digger must have, are a pick and shovel, a large tin "pan" and "riddle."

The pick should be light in make, about 16 inches from point to point, (one end shaped like a chisel), and not more anchor than about three inches in the whole length; it should be pointed with cast steel. With such a pick, a miner will do more work, with much less fatigue, than with the large pick commonly used.

In "deep sinking" or "driving," a short pick with only one point, called a "driving pick" is used. It has a hammer head with which to drive the pegs (used in "slabbing") or wedges or nails, as required.

The shovel should be light, with caststeel blade, and round pointed. The large tin "pan" is used in every process of washing earth for gold. It should be about 18 inches wide at the top, about 11 inches at the bottom, and about five or six inches deep. A smaller pan called a riddle is required; it is about two inches less in size in every way, and has the bottom perforated with holes about a quarter of an inch in diameter. The "pan" and "riddle" are used as follows:—The large pan being full of water, the riddle is filled (with the stuff to be panned) and immersed

in the large pan, where it is shaken until all the sand and fine gravel has passed through. Before throwing out the gravel in the riddle, see that there are no "nuggetts" in it. Having shaken your large pan, pour off the water, allowing it to carry away all the top part of the sand and gravel; again and again fill the pan with water, and shake and pour off until you have very little left in the pan. You then tilt the pan up on edge, and allow the water to flow into your pan and out again; do this again and again: each time you do so, some grains of stone and sand are carried away until nothing is left but the gold. Working with the large pan is called "panning," and it matters not what way you may have to wash the earth, you will have to finish the process by "panning."

Under surface is generally found a stiff clay, which often contains a considerable quantity of heavy gold. The only advantageous way of washing this clay is with a "puddling machine." The site for the machine must be on ground sufficiently high to have a good outlet for your slush, and yet where you can get a good supply of water, either from a running stream or by pumping. Two horses and three men are required to work a puddling machine; one to cart clay, the other to work the harrows in the machine, and one man to pick up the clay and assist in loading the cart. Having half-filled the machine with water, as soon as two or three loads of clay have been thrown in, the horse at the machine commences to work the action of the harrows mixing up the clay with the water. Both horses are kept constantly at work; but whenever the clay is found to be dissolved, the top slush is allowed to run off through the outlet in the machine.

If there is but little sand or gravel and stone in the clay, the machine can be worked for six or eight days without being cleaned out, but generally the machine is "washed up" once a week—on Saturdays. The horses are stopped, and you pass the stuff remaining in the machine through a "long tom."

Clay containing but very little gold pays well worked in this manner. Supposing you have to cart your clay half a mile, which you have to do in some cases, 15 loads ought to be made every day; this at two pennyweights of gold to the load of 40 buckets of clay, will give one ounce, ten pennyweights a day; $7\frac{1}{2}$ ounces for the week's work, which, at \$18 an ounce, will give \$135 a week. As I have said before, three men and two horses can do this: one man and horse to work the machine, one man and horse to cart the clay, and one man to pick up the clay and help to fill the cart.

Of course, when the clay is convenient to the machine, less gold in the clay will pay; for with plenty of water, 60 loads of clay can be puddled in 10 hours' work.

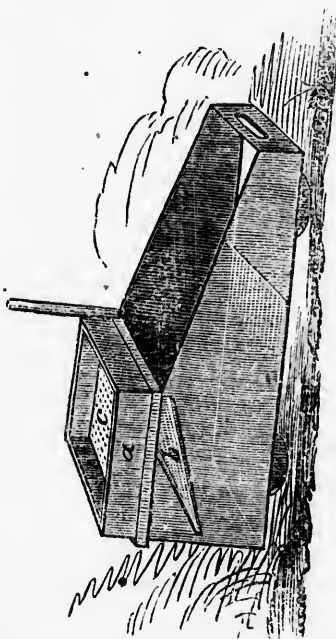
HOW TO MAKE A PUDDLING MACHINE.

A site being chosen, on an elevated position (so as to have a good escape for your "slush"), where you can get a plentiful supply of water, either from a stream or by pumping, and as near to the clay as possible, you commence as follows: Strike a circle 30 feet in diameter; from the same centre a second circle is struck 12 feet less in diameter; between these two lines, you excavate to the depth of three feet six inches, which will form a circular drain, the bottom being

left about one foot less in width than the top. Pieces of wood, from three to four inches square, are let into the sides and bottom of the drain, on which to fasten staves of wood; the side staves being put on first, care being taken to make the joints good. A block of wood, 10 or 12 inches in diameter, is firmly fastened in the centre, and into it an iron spindle. A cross is then made of wood, about 6 inches square and 28 feet long, which will give arms of 14 feet; one of the arms is left about 3 feet longer than the others, to which is attached a "whipple bar." Four harrows are made from limbs of trees, in the shape of a V, in which are fixed a number of stout iron teeth, 8 or ten inches long; these harrows are attached to the arms of the cross. A small drain conducts water into the machine, and in the side of the machine next to the low ground one stave is left out, and the vacant space filled up by short staves six inches in length. These pieces are fixed so that they can be taken out, to allow the slush to run off.

The machine is half-filled with water, and as soon as two or three loads of clay are thrown into different places in the drain, the horse at the machine commences to work; the action of the harrows mixes up the clay with the water; both horses work a way until the clay and water are well mixed. The horse in the machine is stopped occasionally, and one of the small pieces of board being taken out, the top part of the slush runs out.

From what I have seen of the gold fields on the "Chaudière," I think the "cradle" will be as much used by small companies as any other plan of washing.



Some care must be taken in making a cradle, as, if not made properly, it will lose gold.

The body of it is made in the form of a child's cradle, 3 feet six inches long, 17 inches wide at the top, 14 inches wide at the bottom, 14 inches high at the head, 7 inches high at the foot. An opening is made in the foot to allow of the escape of the "tailings."

17 inches from the head of the cradle, a piece of 1 inch stuff is firmly fastened across the cradle, 1 inch higher than the sides. Three other pieces, also one inch higher than the sides and head, are firmly nailed on, making a receptacle for the hopper (*a*-see diagram). The hopper is a box, 4 inches deep and 17 inches square; the sides of 1 inch stuff, the bottom (*c*) of strong sheet iron, perforated with holes (*a*) $\frac{1}{4}$ of an inch in diameter. A piece of $\frac{1}{2}$ inch wood is made to fit immediately under the hopper, its highest end fitting closely against the cross-piece, and the other end being about 5 inches lower, and within an inch

co
H
P
e
e
t
it
d
re
c
es
ba
pr
un

co
"
th
wi
fo
bo
or
tul
bu
one
we
the
fill
pou
and
thr
as
fall
ledg
has

of the head of the cradle. Pieces of wood (*a*) $\frac{1}{2}$ an inch high, are nailed on the sides, and on the lower end a piece $\frac{3}{4}$ of an inch high; its upper end against the cross-piece is of the same height as the sides of the cradle, and the bottom of the hopper should just touch it. This piece is called the slide (*b, a*), and on its fitting closely, and having a proper inclination, depends the saving of fine gold. *d* is the handle for rocking, and *e* is a bar across the bottom of the cradle, which will save any heavy gold that may escape the slide. Should much gold be found at this bar, it is a proof that the slide does not have the proper inclination, and it should be altered, trying it until you get the proper inclination for it.

In the use of the cradle, if the "washing stuff" contains stiff clay, time and gold will be saved by "puddling" the "washing stuff" before putting it through the cradle. The half of a wine or portercask will be found the most convenient "puddling tub" for diggers moving from one locality to another. A box ten or twelve inches deep, two feet by four feet, or even larger than this, makes a first-rate puddling tub, but is very troublesome to move. Five or six buckets of washing stuff, are generally puddled at once, the tub is filled with water, and the stuff is well mixed up; when the water becomes thick, the top is poured off. The tub is again and again filled with clean water and the stuff mixed up and top poured off, until no clay is left in the tub. The sand and gravel remaining, is put into the hopper, two or three shovels full at a time, and pouring water on it as you shake the cradle, it passes through the hopper, falling on the slide, the gold being caught by the ledge at the lower end of the slide. When all that has been puddled, it is passed through the cradle, the

slide is taken out and the sand, etc., on it washed into the pan.

In shallow sinking a miner only wants a pick and shovel, a zinc bucket, and a 1 inch rope, say 30 feet long, and the two pans already mentioned. A man who had never before worked at mining should work in the vicinity of other holes; from those holes you can see which way the bottom dips, and from the inclination of the dip the probable depth of the hole you intend to sink.

If the sinking is more than 6 or 7 feet deep, you will be obliged to use a rope and bucket, and if 15 feet or more, you will want a windlass. For holes of 10 or 12 deep, a limb of a tree, placed across the hole on which to place the foot, will materially assist in hoisting the stuff. The usual way of working in Australia was, if there were only two in the party, for each to work alternately in the hole and on top; one would sink 8 or 10 inches and shovel out the loose dirt, the other then relieved him, sinking an equal depth, and so on, until the hole was so deep that it was difficult to throw the earth up. If, as I said before, the hole was expected to be only 10 or 12 feet deep, they would not take the trouble to make a windlass, but would place a stick across the hole on which to place their foot; as soon as one had sent up the layer of earth, which he had loosened, the one on the top lowered the bucket and hoisted up the earth, and so on.

Whenever you reach a stiff clay holding colored quartz, slate pebbles, iron-stone, etc., you should wash a pan of it, and if you find gold in it to pay you wages for working the hole, you have reached what is called "wash dirt." Having prepared a clean

spot for your "wash dirt," you get it up. In some places it will lay only from 2 to 4 inches thick, on top of pipe clay or slate, and in other places it may be as many feet in depth. The best way to wash such dirt is with a tub and cradle. From 4 to 6 buckets of earth is put in the tub, and the tub nearly filled with water, it is stirred and mixed up with the shovel until the clay mixing with the water, makes it quite thick. It is allowed to settle for a moment, and then the top is poured off. It is again and again filled with water and put through the same operation, until nothing is left in the tub except sand and gravel. The tub being convenient to the cradle, a couple of shovelsful of sand, etc., from the tub, is put into the hopper, and pouring water on it, as you rock the cradle, all the fine stuff passes through the hopper and falls on the slide, whereas the gold is saved by the riffle at the bottom of the slide. When you have passed all the stuff in the tub through the hopper, the hopper is taken off and the slide taken out, and all the sand, etc., at the riffle is washed off into the "riddler." Most parties will cradle 4 or 5 tubs before they pan off, as before described.

Most parties have a frame, on which to work the cradle, but a piece of wood, well fixed in the ground under each rocker, will answer. The bottom of the cradle should be at an inclination of about 2 inches in the foot, and when fitting the slide in the cradle, allowance should be made so as to have both the slide and bottom of the cradle at a proper inclination.

A windlass is generally roughly made; the trunk of a small tree, as round as you can get it, and 8 or 10 inches in diameter, will answer for the barrel, which is made with spindles. A heavy piece of wood

is left attached to one of the spindles, in which to fix a crooked limb to answer as a handle. To support the barrel you have four pieces of wood of equal length, which are crossed near the ends, and ties are nailed on to bind them together.

When all the "wash stuff" is taken from the bottom of the hole, a "drive" is opened (a drive is the earth taken out in an horizontal direction).

The drive is made in the earth just above the "wash dirt," and, where you are not liable to be encroached on, every 3 or 4 feet you drive, you take up your "wash dirt," and, if it lays thick, wash it. In this way you diversify the work, and it is not so fatiguing.

It is well to work from the outside of your claim towards the centre, and whenever you have 5 or 6 feet square of earth driven out, a prop should be put in, with a piece about 2 feet long as a cap on it; wedging it up firmly, by these means, you run but little risk of the top of your drive falling in on you.

In what is termed "deep sinking," considerable experience is required, as the lives of the miners, and the durability of the shaft, depend on the care taken in putting it down.

In all deep holes the different stratas of earth vary very much. Sometimes you are obliged to commence your shaft in a rich mould, which would fall in from the sides of the hole, if not supported in some manner, and when you got through it, and some other stratas, you would probably encounter a loose drift of sand and water, which pours in as quick or quicker than you can bail it out, and in many cases springs of water are struck, which require steam pumps to keep them dry.

s, in which to fix
e. To support
wood of equal
ls, and ties are
n from the bot-
(a drive is the
ion).

ust above the
t liable to be
drive, you take
hick, wash it.
nd it is not so

f your claim
u have 5 or 6
should be put
a cap on it;
you run but
ng in on you.
considerable
the miners,
on the care

f earth vary
o commence
fall in from
some man-
some other
ose drift of
or quicker
ses springs
a pumps to

Eight and generally twelve men join together to sink in the deep sinking, as considerable capital is required, and when once they have the hole started, they work in watches "night and day," "Sunday and Monday," "without stop or stay." The principal reason for working at it without intermission, is for fear of water coming in on them, which is often avoided by quick sinking.

Before commencing to sink, some time is required to prepare materials, etc. On the ground on which you have determined to sink, logs 10 or 12 inches in diameter are dovetailed together, and built up in tiers, the size of the shaft you are going to sink (generally 4 feet six inches by 2 feet six inches). Logs are built up in this way, so that the earth which is taken out from the holes has not to be carried any distance, but is emptied from the bucket over the edge of the platform made on the logs. Timber split into slabs, $1\frac{1}{2}$ or 2 inches thick, and as wide as possible, is first trimmed with an adze to an equal thickness, and then cut in sets of four of an equal width, two pieces of 30 inches long, and the other two pieces of 60 inches long. The short pieces must have the ends exactly square. 3 inches from the ends of the long pieces, two or three holes are bored of 1 inch in diameter, and pegs of wood made to fit the holes. A number of sets of these slabs will be required. In commencing the shaft, it is sunk down 4 or 5 feet, and the bottom having been made perfectly level, a set of slabs are put in. Of course each set must be of an equal width. The long slabs are put in first, and then the short slabs are put between the long slabs and driven towards the ends until the pegs can be put into the holes. In this way a box is formed, the

sides being kept in their place by the ends, and the ends kept in their place by the pegs, which prevent the earth from pressing in the ends. You must be very particular putting in the first set of slabs, having them perfectly level, and as square in shape as possible, as the first set put in is the rule or guide for all the rest; set after set are put in until they are as high as the first tier of logs, from which strips of hoop iron are fastened down the sides and ends of the shaft, which keep the slabs from sinking as you get down.

For a deep shaft you require a good windlass; the uprights are morticed into the top logs, and are well braced together and made perfectly solid; the barrel of about twelve inches in diameter, working on iron spindles, and made to work with as little friction as possible; iron handles with a good leverage will be required.

Two thirty-gallon kegs are used for hoisting the dirt. The rope is put on from one end of the barrel, and the kegs are put on, so that one is going down as the other comes up, the weight of the bucket going down being an assistance in raising the other.

Two men are required at the windlass and one in the shaft; the rest prepare the slabs; at night they work in watches of four, two at the windlass, one in the shaft, and one to have slabs, etc., ready.

The man in the shaft, having sunk eight or ten inches, signals for a set of slabs of a given width; they are lowered down, and he fits them in, fixing them close to the set above.

Where the ground is soft and loose, it requires considerable time to get in a set of slabs. In some ground, a set every six hours is considered good work, and in wet ground, it is sometimes impossible to sink,

Unless a number of shafts are sunk at the same time in this way, or a number of men continue bailing at the same time, the water is difficult to be got under.

As I have stated before, by having the work go on quickly, you sometimes escape a great deal of water. As soon as you sink a sufficient depth for a set of slabs, the water finds its way through the loose earth, and if not quickly stopped by the slabs being put in, it soon increases, and brings with it the earth from behind the slabs, and the shaft is lost.

I remember working at a shaft for two months and having to abandon it; we could not get lower than sixteen feet. It was in Spring Hill Gully, at Creswick's Creek, twelve miles from Ballarat. The gully was narrow, seldom allowing of more than two claims in width. We struck a drift of water, about sixteen feet down, and although we bailed night and day for three days, we could not get the water under, and the shaft twisting out of square, it was not safe to work it. We took the slabs out, filling up the hole with stiff clay, on which water has no effect; twice we sunk in the clay, but as soon as we got through the clay the water would master us; and as some of the claims higher up on the lead were bottomed without getting gold, we, along with the others, abandoned our claim. Two years after, the summer being a very dry one, diggers again went to work in that gully, and claims on the lead paid from £500 to £2,000 a man.

When the shaft is bottomed, you sink four or five feet deeper into the rock or slate, forming a well, which drains your drives, and keep them comparatively dry. Generally in dirty ground the wash dirt is

hard and firm, and the water comes only from the shaft, but in all cases a well is necessary.

As I have before stated, deep sinking requires capital, as it takes sometimes twelve or fifteen months before you get a return, and indeed in many cases, after spending much time, labour, and money, you find you are not on the lead, and the shaft is worthless. You take the slabs (which will do for another shaft) out, and commence again, on what you hope will prove rich ground.

I saw in the Edinburgh Review of January, 1863, an article on Australian mines, which mentions a claim which took three and a-half years to sink, and which yielded 17,600 ounces the first fifteen months' work, and was expected to take ten years' yielding, 176,000 ounces, before it was worked out.

In working a quartz reef, a shaft is sunk as if for deep sinking (in Australia, almost all reefs have what is termed a dip, that is the reef is not perpendicular). The shaft is sunk under the dip, and drives made to the reefs, which is worked with gads, crowbars, and often blasting is required; after the quartz is taken out, it is burnt before being crushed.

In many cases steam is required to bail, and is also used working the windlass.

As soon as the reef opposite the drive, and five or six feet below it, is quarried out, another drive is made ten or twelve feet lower down, and so on. In preparing quartz for the crushing mills, the miners generally burn it themselves, as follows:

A row of large logs are placed about four or five inches apart, the interstices filled up with brush, and brush laid on top of them; a layer of quartz of eight

or ten inches thick is put on the brush, another row of logs on the top of the quartz, and so on; it is built up in this manner five or six feet in height, and fire put to the bottom. When the wood is burnt, the quartz will be sufficiently burnt for crushing.



Gold License used in Australia.

Annexed will be found the form of License used in Australia:—

NOT TRANSFERABLE.



£2



£2

GOLD LICENSE.—THREE MONTHS.

No.

185 .

The Bearer

having paid the sum of **TWO Pounds** on account of the General Revenue of the Colony, I hereby License him to mine or dig for Gold, reside at, or carry on, or follow any trade or calling, except that of Storekeeper, on such Crown Lands within the Colony of Victoria as shall be assigned to him for these purposes by any one duly authorised in that behalf.

This License to be in force **THREE Months** ending 
and no longer.

Commissioner.

REGULATIONS TO BE OBSERVED BY THE PERSONS DIGGING FOR GOLD OR
OTHERWISE EMPLOYED AT THE GOLD FIELDS.

1. This License is to be carried on the person, to be produced whenever demanded by any Commissioner, Peace Officer, or other duly authorised person.
2. It is especially to be observed that this License is not transferable, and that the holder of a transferred License is liable to the penalty for misdemeanor.
3. No Mining will be permitted where it would be destructive of any line of road which it is necessary to maintain, and which shall be determined by any Commissioner, nor within such distance around any store as it may be necessary to reserve for access to it.
4. It is enjoined that all persons on the Gold Fields maintain a due and proper observance of Sundays.
5. The extent of claim allowed to each Licensed Miner is twelve feet square, or 144 square feet.
6. To a party consisting of two Miners, twelve feet by twenty-four, or 288 square feet.
7. To a party consisting of three Miners, eighteen feet by twenty-four, or 432 square feet.
8. To a party consisting of four Miners, twenty-four feet by twenty-four, or 576 square feet: beyond which no greater area will be allowed in one claim.

